DOCUMENT RESUME

ED 235 428 CG 016 962

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TITLE Nonverbal Effects in Memory for Dialogue.
PUB DATE Apr 83
NOTE 31p.; Paper presented at the Annual Convention of the Southwestern Psychological Association (29th, San Antonio, TX, April 21-23, 1983).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Affective Behavior; *Body Language; *Cognitive Processes; College Students; Cues; Higher Education; *Memory; *Nonverbal Communication; Psycholinguistics; Retention (Psychology); Verbal Communication

ABSTRACT

Memory for everyday conversational speech may be influenced by the nonverbally communicated emotion of the speaker. In order to investigate this premise, three videotaped scenes with bipolar emotional perspectives (joy/fear about going away to college, fear/anger about having been robbed, and disgust/interest regarding a friend's infidelity) were developed. The perspectives differed only in the nonverbal behaviors of voice tone, body posture, gestures and facial expression. Following validation of the videotapes, 96 undergraduates, divided into 12 groups, viewed one perspective of each scene, counting specific nonverbal behaviors (shallow processing) or rating the meaning of those behaviors (deep processing). Either immediately or after 1 week, memory for the verbal content of the scenes was tested, using a forced-choice recognition procedure. Analysis of the results showed that memory for surface form and semantic content was better for the immediate test condition. In all conditions, subjects chose more of the nonverbal distractors that were consistent rather than opposite of the emotions viewed. (BL)

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NONVERBAL EFFECTS IN MEMORY FOR DIALOGUE

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Abstract

Memory for dialogue is influenced by the nonverbally communicated emotion of the speaker. Each of three scenes were videotaped from two emotional perspectives. The two perspectives differed only for nonverbal behaviors of voice tone, body posture, gestures and facial expressions that the actors displayed. Subjects viewed one perspective of each scene, counting nonverbal behaviors (shallow processing) or rating the meaning of those behaviors (deep processing). Either immediately or after one week, memory for the verbal content of the scenes was tested, using a forced-choice recognition procedure. Alternatives included distractors for verbatin, semantic, and "emotional" memory (verbal expressions of the nonverbally communicated emotions). Memory for surface form and semantic content was better for the immediate test condition. In all conditions, subjects chose more of the nonverbal distractors that were consistent rather than opposite of the emotions viewed. These findings indicate good retention of surface form of discourse in natural settings, and the tendency for subjects to rely on their memory for emotion when trying to remember the verbal content of the dialogue.

INTRODUCTION

Memory for dialogue or everyday conversational speech may be influenced by the nonverbally communicated emotion of the speaker. This implies that people notice and utilize information other than the explicit verbal information of the text and that this information gets integrated into memory. For example, a son who has told his mother of his plans to marry may ask her for her opinion. The mother may verbally react in a neutral manner while nonverbally communicating the emotion of sadness (i.e. a sad face, a low-pitched tone of voice). Some time later, the son's fiance asks him how his mother felt about the marriage. The son may recall that his mother was sad and that she said something that was indicative of her sadness, even though in reality, her comments were entirely neutral. In this illustration, the nonverbally communicated emotion of sadness was stored in memory as well as the verbal content of the dialogue. In recalling the verbal content, the nonverbal information influenced what was remembered.

A vast body of research has clearly established the notion that one's affective state can be accurately identified via nonverbal behaviors (e.g., Davitz, 1964; Fridja, 1969; Ekman, Friesen & Ellsworth, 1972). Among the issues that have emerged as a result of these studies on the decoding of nonverbal cues is the interaction between the verbal and nonverbal components of communication and how much each level contributes to the overall interpretation of behavior. Much of the research addressing this issue has been conducted by Mehrabian and his colleagues (Mehrabian, 1968a, 1971b, 1972c; Mehrabian & Ferris, 1967) in which verbal cues were presented within the content of the dialogue and nonverbal cues were presented auditorially through voice tone and/or visually by facial expressions and body posture. The findings have indicated that interpretive judgments of emotion are based mainly on nonverbal cues when

nonverbal and verbal cues are presented simultaneously. They also suggest that receiving both nonverbal and verbal cues lead to more accurate interpretations of emotion and interpersonal situations than just receiving the verbal cues alone. (Accuracy of emotional interpretation was defined by the intent of the actor in communicating a particular emotion, as well as preconceived notions of the experimenter of which particular emotion was being portrayed.) Findings such as these provide support for the notion that interpretations of nonverbal information, in addition to verbal material, get encoded.

The effect of nonverbally communicated emotion on memory may be viewed as similar to bias effects in constructive and reconstructive memory. Typically in memory-bias experiments, subjects are presented with target information, followed later by tests of recognition or recall. Presented separately from this to-be-remembered information are sources of information that may serve as potential biases. These potential biases can influence how memory for the target information is encoded, stored, or retrieved and can cause errors in remembering the target information. Two examples of biases are pre-experimental knowledge and misleading information. Sulin and Dooling (1974) report that subjects were more likely to make false positive errors on a recognition test when they were presented with a passage about Adolph Hitler than they were when the same passage was presented as an autobiography of a ficticious character. The subjects' pre-experimental knowledge of Hitler served as a bias to influence memory for the passage. Similarly, Loftus, Miller & Burns (1978) have demonstrated that presenting subjects with subsequent information that was contradictory to target information led to more recognition errors than when the subsequent information was consistent with the target information. Nonverbally communicated emotion might be viewed as a source of biasing information even though it occurs at the same time with the original event.

Furthermore, the effect of emotion, portrayed nonverbally, on memory for verbal content was theorized to operate via constructive or reconstructive processes. A constructive view of memory would argue that nonverbal information becomes integrated with the verbal content of dialogue in memory and forms a holistic representation of the original event. A prediction consonant with this approach is that subjects would be more likely to choose recognition distractors congruent with the nonverbally communicated emotion that they viewed and that these errors reflect an inability to distinguish between the nonverbal information and the verbal content. On the other hand, a reconstructive view would argue that actual stored traces of the veridical information, as well as the nonverbal information, exist in memory but that they exist separately and are not integrated. If traces weaken with the passage of time, it follows that once subjects forget the surface form or specific semantic content of the dialogue, they rely on representations of emotion to reconstruct it. Fredericksen (1975) has developed this rationale by arguing that overgeneralizations occur when detailed and specific aspects of the original event are missing from memory or are unretrievable, and that inferences can reflect attempts to generate missing or nonretrievable material.

In this thesis research, constructive processes would be reflected by little or no difference between the immediate and delayed test conditions in choosing the nonverbal distractors. Errors would reflect the semantic integration of the nonverbal information with memory for the dialogue and, thus, would not be influenced by a decline over time in memory for specific meaning or surface form. Evidence of reconstructive processes would be provided if subjects tested after a week made more errors consistent with the portrayed emotion than those subjects tested immediately. These errors would reflect an inability to retrieve the detailed and specific information of the dialogue and

a reliance on the emotion, functioning as a retrieval bias in reconstructing the original event. Findings which support this view of memory typically report that subjects are more likely to make false positive errors on a recognition test after a delay of one week or more than when they are tested immediately (e.g., Sulin & Dooling, 1974; Dooling & Christiaansen, 1977).

An additional aspect of the reconstructive view of memory is that the increase of overgeneralizations and inferences with the passage of time are accompanied by a decrease in memory for surface form (Frederiksen, 1975). In this study, a decrease in memory for surface form would invite reconstructive errors based on emotion to occur. Our knowledge of memory for surface form, in general, emanates from research which suggests that memory for surface form is extremely weak and transient, as compared to memory for meaning (e.g., Sachs, 1967; Garrod & Trabasso, 1973; Pillsbury & Meader, 1928; Brewer, 1974). However, this view of memory has been challenged by recent research with findings of robust retention for surface form of discourse in natural settings. Kintsch and Bates (1977) reported significant surface memory for topics, details, jokes and irrelevant statements taken from a classroom lecture with the student unaware that they would be tested. And in a study by Keenan, MacWhinney and Mayhew (1977), memory for surface form was found to be significantly better for high interactional content statements (i.e. statements that conveyed information about the speaker's intentions, his beliefs and his relationship with the listener) than for low ones. In both studies, the usual occurrence of a decline in surface form retention with the passage of time was also observed.

In order to observe the relationship between reconstructive errors and memory for surface form in the present study, exact wording and meaning distractors were included on the recognition test. It was predicted primarily that memory for surface form and meaning, or the exact semantic content of the

sentences, would be better when subjects were tested immediately than after a delay of one week; subjects in the immediate test condition should choose more of the target items, rather than specific meaning distractors or surface distractors (given accurate memory for meaning). Consistent with the reconstructive view of memory, a decrease in memory for surface form of the dialogue as well as its semantic content at the delayed test should be accompanied by an increase in choosing nonverbal distractors congruent with the particular emotions portrayed. On the other hand, constructive processes would be supported by subjects choosing similar numbers of consistent nonverbal distractors at both the immediately and delayed test conditions, regardless of whether memory for surface form and meaning decreased or stayed the same.

A second line of reasoning that guided this research concerned the type of processing of nonverbal information and its relationship to memory for dialogue. The levels of processing approach (Craik and Lockhart, 1972) proposes that memory is a function of how information is processed or analyzed. Incoming stimuli are subjected to a series of analyses starting with shallow sensory analyses and proceeding to deeper, more complex, abstract and semantic analyses. Memory is thus seen as a by-product of the depth of processing, with information analyzed only at a shallow level being soon forgotten. Information that is deeply processed -- fully analyzed, integrated, and enriched by associations or images is longer lasting. The concept of levels of processing has been sucessfully tested using a variety of stimulus materials (e.g., Craik & Tulving, 1975; Bower and Karlin, 1974). Since this approach views all incoming stimuli as being subjected to a series of processing steps which vary along a continuum of depth, it follows then that nonverbal information, communicating emotion, is also susceptible to this series of analyses. Furthermore, deep processing of

nonverbal information may determine the abstraction of emotional concepts and thereby influence memory for dialogue on a subsequent recognition test.

In this thesis research, the two levels of surface versus deep processing were employed. The task of tabulating specific body movements was designed to encourage subjects to process the nonverbally communicated emotion at a shallow level, where pattern recognition and minimal extraction of meaning occurs. However, when subjects are required to interpret emotion, movements or postures of hands, feet, and other body parts contribute to the overall recognition of emotion (e.g., Carmichael, Roberts & Wessel, 1973; Ekman, 1965; Ekman & Friesen, 1967). The deep level task required subjects to rate the meaning of those behaviors by choosing a label for the emotion they reflected or represented. This task should encourage subjects to process the nonverbal information at a level where semantic and associative analyses are undertaken. Therefore, the deep task requires processing of the nonverbal information at a level similar to the propositional nature of the dialogue. Both the nonverbally-communicated emotion and the propositional content share the common basis of being processed at a semantic level and are therefore likely to become integrated in memory or to compete during retrieval. On the other hand, the surface task of tabulating body movements does not require processing at a semantic level and therefore, nonverbal information is less likely to influence memory for the verbal content of the dialogue.

For this thesis research, each of three scenes were videotaped from two emotional perspectives (joy/fear about going away to college, fear/anger about having been robbed, disgust/interest regarding a friend's infidelity). The two perspectives differed only for the nonverbal behaviors of voice tone, body posture, gestures and facial expressions that the actors displayed. Subjects viewed one perspective of each scene, counting nonverbal behaviors (shallow

processing) or rating the meaning of those behaviors (deep processing). Either immediately or after one week, memory for the verbal content of the scenes was tested, using a forced-choice recognition procedure. Alternatives included distractors for verbatim memory, semantic memory and "emotional" memory (verbal expressions of the nonverbally communicated emotions).

METHOD

Design

A factoral design was employed with twelve subjects in each cell. The between-subject factors were Task, Test and Emotion. The Task factor referred to the type or level of processing nonverbal material that was biased by the subjects' task. The first level of this factor was a type of surface processing by which subjects recorded the frequencies of nonverbal behaviors while viewing videotaped scenes. The second level was a type of deep processing by which the subjects' task was to rate the meaning of those nonverbal behaviors. The Test factor indicated the time at which memory for the verbal content of the scenes was tested (approximately five minutes after task completion or one week later). Emotion consisted of the combination of nonverbally communicated emotions in the videotaped scenes that was presented to the subject. In the first condition of Emotion, subjects saw one version of each of the three scenes (disgust for the restaurant scene, joy for the classroom scene, fear for the telephone scene) while the other versions (interest, fear and anger, respectively) were used for the second condition of the Emotion factor. The within-subject factor was Scene. All subjects viewed one version of the restaurant, classroom and telephone scenes. The counterbalancing factors were Recognition Test Form, in which subjects received either Form 1 or 2, and Scene Order, which consisted of three different orders of presentation (A - telephone, restaurant, classroom; B - classroom, telephone, restaurant; and C - restarurant, classroom, telephone).

Subjects

A total of 105 undergraduate students at Trinity University volunteered as subjects in order to receive credit in an introductory psychology course. Groups of four and five subjects were randomly assigned to the eight between-subject conditions. Subjects in the immediate test condition were run

in groups of four while those in the delayed test condition were run in groups of five to guard against the possibility of a low subject return rate for the second session, as well as to preserve an equal number of subjects in each of the twelve cells. On the contrary, the subject return rate was very good with only three subjects failing to return for the second session. Since only four subjects in each cell were needed, the data from the fifth subject in each delayed test condition were discarded. Six subjects were eliminated by this procedure, leaving a total of 96 subjects whose data were analyzed.

Materials

Scenes. Three short scenes were videotaped from each of two emotional perspectives. The restaurant scene consisted of a woman's reaction of disgust or interest regarding a friend's infidelity; the classroom scene was about a girl's joy or fear about going away to college; and in the telephone scene, a woman expressed anger or fear about having been robbed. The two versions of each scene contained the same dialogue and differed only in the nonverbal behaviors of voice tone, body posture, gestures and facial expressions that the main character displayed.

In originally selecting the two emotions to be nonverbally communicated for each scene, Plutchik's emotion solid (1980) was employed in order to choose those primary emotions that were directly opposite from each other (bipolar) or emotions that were similar to each other and thus, in close proximity at a medium level of intensity of the emotion solid. This led to the selection of the bipolar emotions of acceptance and disgust for the restaurant scene and the bipolar emotions of anger and fear for the telephone scene. The emotions of joy and fear for the classroom scene, however, were not bipolar but rather close in proximity to each other on the emotion solid, separated by the emotion of acceptance.

In order to validate the two emotional perspectives of each scene, thirty-six pilot subjects either saw one set of three scenes, the other set comprised of the alternate versions, or read a written transcript of each scene's dialogue. Their task consisted of picking from a list of adjectives, five adjectives that they felt were most characteristic of the main character. Adjectives that were selected four or more times within any condition served as the criterion for analyzing the data. Adjectives that were picked by subjects who saw the disgust version of the restaurant scene were annoyed, disgusted, displeased and irritated. The adjectives for those subjects who saw the acceptance version were amused, curious, fascinated and interested. Although, it was the emotion of acceptance that was attempted to be portrayed, subjects chose adjectives that reflected more of an interest dimension. Therefore, the label of acceptance was replaced with the label of interest. For the classroom scene, subjects who saw the joy version chose the adjectives delighted, elated, excited, happy, joyful, proud and self-satisfied, while the adjectives anxious, confused, fearful, insecure and nervous were selected by those who viewed the fear version. And for the anger version of the telephone scene, the adjectives angry, annoyed, disgusted, irritated and upset were chosen, while for the fear version, subjects chose the adjectives anxious, depressed, distressed and upset. Again it appears that although the particular emotion of fear was trying to be communicated, a different mood, that of distress or depression, was represented instead. In this case, however, the label of fear was not changed because the adjectives chosen were thought to be synonymous of the emotion fear. It is interesting to note that subjects who only read the written transcript of each scene made selections quite similar to those who viewed the videotapes. However, they did not do so in the same consistent fashions of the latter group of subjects. For example, subjects who saw the disgust verion of the restaurant

scene chose the adjective displeased a total of eight times, while no one who saw the interest version chose it. Subjects who read only the script were just as likely to pick the adjective displeased as they were of picking the word curious, an adjective chosen by those subjects who viewed the interest version. Therefore, the choice of adjectives were distributed more evenly across both conditions of emotions in the script condition than they were in either of the emotion conditions. In some cases, however, the frequency with which a particular adjective was selected surpassed that of the same adjective for those subjects who viewed the videotapes. This demonstrates that the task of labeling a person's mood or emotional state biases one to read emotion or meaning in written material, even when its content is neutral. (See Table 3 in Appendix II for the adjectives chosen and their frequencies.)

In a second task, subjects answered interpretive questions about the person and her situation in each of the three scenes by using a 7-point scale from "not at all" to "extremely." Subjects who viewed the videotapes made more judgments consistent with the particular emotions they had viewed than those subjects who only read the written transcript. For example, if a subject saw the fear version of the classroom scene, he or she was was most likely to answer the questiom, "How fearful did Person 1 seem about going away to the university?," with a rating near "extremely" while a subject who read only the transcript would give a more neutral rating and the subject who saw the opposite version (joy), would give a rating near "not at all." This ordering of median ratings occurred for ten of the total of twelve questions. (See Table 4 in Appendix II.)

Recognition Test. The forced-choice recognition test for each scene consisted of six items containing four alternatives. For all three scenes, two of the six items included the following four alternatives: (a) Target - the actual sentence that occurred in the scene's dialogue; (b) Wording Distractor -

a sentence in which the exact wording of the target sentence was changed, but the meaning preserved; (c) Meaning Distractor - a sentence in which the syntax of the target sentence remained intact but the meaning was changed slightly by substituting words or phrases that appeared in the target sentence; and (d) Wording/Meaning Distractor - a sentence in which the two previous wording and meaning distractors were combined. For each scene, the remaining four items also contained the Target sentence and the Wording Distractor as alternatives but included two alternatives that served as nonverbal distractors. The first nonverbal distractor was identical to the target sentence but differed only in the substitution or addition of words or phrases that reflected the nonverbally comminicated emotion for each scene's particular version. This type of distractor was labeled after its appropriate emotion, for example the nonverbal distractor in the classroom scene's "joy" version was labeled "Joy." The second nonverbal distractor, Wording/Nonverbal Distractor, combined the Wording and the first nonverbal distractor.

Two forms for each scene's recognition test were constructed so that for each form, there would be two items that contained the nonverbal distractors that were congruent with the emotion viewed, as well as two items that contained the nonverbal distractors appropriate for the other emotional version of the scene. Thus, both forms of each recognition test included items reflecting both emotional versions of the scene. If, for example, Item 4 on Form 1 contained the "Joy" nonverbal distractor, that item on Form 2 contained the "Fear" distractor. Then Item 6 might contain a "Fear" distractor on Form 1 but a "Joy" distractor on Form 2. This was done in order that the eight nonverbal distractors would be equally distributed among forms. The order of the alternatives in each item as well as the items themselves were randomly assigned

for each scene, and were identical for both forms of each scene's recognition test.

Procedure. When subjects arrived for the first session of the experiment, the experimenter informed them that they were about to participate in a pilot study for a future experiment on the social psychology of conversation. The subjects in the surface level of processing condition were then told that the purpose of the pilot study was to insure that the videotaped scenes contained an adequate amount of, as well as fairly noticeable body movements. Their task, for each of the three videotaped scenes, was to focus on a specific body movement of the main character and to record its frequency. The specific body movement was: head nodding by the listener in the restaurant scene, hand movements by the student who got accepted to college, and eye movements in the telephone scene. In order to make their marks automatically, subjects were asked to keep their eyes on the videotape and to position their hand within the general area of the frequency count section of the task sheet. The experimenter encouraged the subjects to listen to the conversation and mentioned that they would be asked later to make a rating on how interesting each scene was and to give a short description or title for the conversation.

Following the completion of each scene, subjects were allowed several minutes to do the remainder of the tasks on the task sheet. These tasks consisted of rating on a 7-point scale the overall pitch of the main character's tone of voice from (1) "low" to (7) "high." This was followed by a rating of the conversation from (1) "not at all interested" to (7) "very interested" and a request for a title or description of the conversation.

Subjects in the deep level of processing condition were led to believe that the nature of the pilot study was to investigate judgments concerning voice tone and body posture. Their first task, for each of the three scenes, was to judge

whether the main character's tone of voice fit with her body posture in communicating her general attitude. This judgment was made on a scale that ranged from (1) "body posture and voice tone are not discrepant" to (7) "body posture and voice tone are "discrepant." A second task consisted of picking from a list of adjectives, five adjectives that described the main character's general attitude as expressed by voice tone and body posture only. Both tasks followed the completion of each scene and were, in turn, followed by the tasks of rating how interesting each scene was and giving a title or short description of the conversation. Scene order was counterbalanced by equally distributing the three different scene orders within conditions.

After either the surface level task or the deep level task was completed, the experimenter dismissed those subjects in the delayed-test condition and informed them that when they returned in one week they would judge additional scenes. After an interval of approximately five minutes, subjects in the immediate test condition were informed that an additional purpose of the study was to investigate memory for verbal material presented on videotape. The three recognition tests were then administered one at a time and in the order that the scenes had been presented. Instructions regarding the recognition test for both the immediate and delayed conditions were:

> Below is a list of six recognition items pertaining to each videotaped scene you have observed. Each item contains four alternatives. Please choose the alternative you believed occurred in the videotape by circling the appropriate letter. (Be sure to choose one, and only one, from each item, even if you have to guess.)

Upon completion of the recognition tests, subjects were debriefed and asked to return in one week, only to receive credit for their participation.

The experimenter informed subjects in the delayed-test condition at the beginning of the second session that they had been deceived regarding the purpose of returning and that the real purpose of the delay was to discover how well they remembered the verbal content of the scenes they viewed in the first session. Each scene's recognition test was then administered in the order that the scene had been viewed. The experimenter encouraged the subjects to remember as much as they could about the scenes in completing the tests. The subjects were then debriefed and given credit for their participation. The two forms for each scene's recognition test were evenly distributed within both the immediate- and delayed-test conditions.

RESULTS

Memory for Surface Form

To address issues concerning memory for surface form of discourse in natural settings, three separate analyses of variance were carried out. A multivariate approach was taken for analyses employing the within-subject factor of scene. For reliable effects in these analyses, the approximate multivariate F from the Wilks Lambda criterion will be reported.

The first analysis addressed memory for meaning (the likelihood of choosing either the target item or its paraphrase). A measure of memory for meaning was calculated for each subject by adding the number of correct choices of the target item to the number of choices of the exact wording distractor. Memory for exact wording was measured and analyzed in two ways: correct choice of target and proportion of correct meaning responses also correct with respect to exact wording (number of target choices divided by number of choices of the target item or exact wording distractor). For all analyses, alpha was set at .05.

Memory for meaning. Subjects who were tested immediately demonstrated better memory for meaning than those subjects who were tested after an interval of one week, as indicated by a main effect of test, $F(1,88) = 20.72$, $MS_e = 24.50$. Subjects in the immediate test condition chose the target or exact wording distractor for a mean of 4.93 items, while those subjects tested at one week chose the target or exact wording distractor for a mean of 4.35 items. Thus, subjects tested immediately were better at rejecting false paraphrases and nonverbal distractors than those subjects tested after one week. There was a significant three-way interaction of task by emotion by scene, approximate $F(2,87) = 4.37$. This interaction can be understood by inquiring about simple interactions within each scene. There was a significant interaction of task

with emotion for the telephone scene only, $F(1,88) = 7.59$, $MS_e = 1.05$. Subjects in the surface task condition who viewed the fear version demonstrated better memory for meaning than those subjects who viewed the anger version. This finding was opposite for subjects in the deep task condition. Memory for meaning was higher for those subjects who viewed the anger version than for those who viewed the fear version. This interaction for the telephone scene can be understood to reflect corresponding errors in choosing nonverbal distractors. When subjects attended to and tabulated specific body movements, more of the nonverbal distractors were chosen when the anger version rather than the fear version was viewed. When subjects rated the meaning of those body movements, more of the nonverbal distractors were chosen when the fear version rather than the anger version was viewed.

Memory for exact wording. Table 1 presents the mean proportion of correct choice of the target, given accurate memory for meaning for each condition of test, task, and scene. Subjects tested immediately chose the target more than those subjects tested after one week, given accurate memory for meaning. This was indicated by a main effect of test, $F(1,88) = 5.67$, $MS_e = .24$, in which subjects in the immediate test condition made a mean proportion of .72 correct choices as compared to a mean proportion of .66 correct choices for the subjects in the delayed test condition. However, both conditions performed well above the chance level of .5. The proportion of correct choices made by the subjects also depended upon the particular scene, as indicated by a main effect of scene, approximate $F(2,87) = 8.00$. Subjects demonstrated a higher proportion of correct choices for the restaurant (.75) and classroom (.72) scenes than for the telephone scene (.62). There was a three-way interaction of task by emotion by scene, approximate $F(2,87) = 3.67$. In comparing the proportion of correct choices for the classroom scene with the proportion for the restaurant and

Table 1

Mean Proportion of Correct Meaning Choices Also Correct for Surface Form

	Immediate	Delayed
Surface		
Restaurant	.79	.67
Classroom	.69	.71
Telephone	.67	.59
Total	2.15	1.97
Deep		
Restaurant	.82	.72
Classroom	.72	.76
Telephone	.67	.54
Total	2.21	2.02

Note. Each entry is based on the data from 24 subjects.

telephone scenes combined, a significant interaction of task with emotion was discovered for the restaurant and telephone scenes only, $F(1,88) = 4.66$, $MS_e = .08$. Subjects in the deep task condition who viewed the disgust version of the restaurant scene and the fear version of the telephone scene made the highest proportion of correct choices. There was also a significant interaction of test with scene, approximate $F(2,87) = 3.87$, in which subjects tested immediately made a higher proportion of correct choices for the restaurant and telephone scenes than those subjects tested at a delay. Similar to these findings concerning memory for the target, given correct memory for meaning, a main effect of test and a three-way interaction of task by emotion by scene were significant when looking only at memory for the target.

Nonverbal Effects on Dialogue Recognition

To address the question of nonverbal effects on dialogue recognition, an analysis of variance was performed on the number of errors in choosing nonverbal distractors. Since the recognition tests contained distractors reflecting both emotional versions of each scene, there existed two types of errors that subjects could make when choosing either of the two nonverbal distractors for the four items. A consistent error was made if subjects chose a nonverbal distractor that was congruent with the particular emotional perspective they had viewed. For example, if a subject watched the joy version of the classroom scene and on the subsequent test chose a joy distractor, this would be a consistent error. On the other hand, an opposite error was made if subjects chose a nonverbal distractor that was opposite of the particular emotional perspective they viewed. If a subject saw the joy version but chose a fear distractor, this would be an opposite error. Thus, memory for the nonverbally communicated emotion in each scene was calculated for each subject by adding the number of consistent errors, as well as the number of opposite errors made when

choosing the nonverbal distractors. Again, a multivariate approach was taken in analyzing within-subject factors of scene and distractor type (consistent versus opposite).

Table 2 presents the mean number of errors in choosing nonverbal distractors for each condition of type of distractor, test, and scene. Subjects tested after an interval of one week chose more nonverbal distractors overall than those subjects tested immediately, as indicated by a main effect of test, $F(1,88) = 10.13$, $MS_e = 4.00$. Out of a total of four items in which nonverbal distractors were included as alternatives, subjects in the delayed test condition chose the nonverbal distractors for a mean of .47 of the items while subjects in the immediate test conditions chose the nonverbal distractors for a mean of .30 of the items. A significant main effect of distractor type, $F(1,88) = 5.63$, $MS_e = 1.00$, further demonstrated that overall, more consistent errors were made than opposite errors. Out of two items in which the nonverbal distractors were consistent and two items in which they were opposite, subjects made consistent errors for a mean of .40 for the items, while opposite errors were made for a mean of .34 of the items. Thus, subjects tended to choose the nonverbal distractors congruent with the emotional perspective they viewed more than those distractors opposite of the emotional perspective viewed. There was a significant three-way interaction of emotion by scene by distractor type, approximate $F(2,87) = 7.41$. In acquiring about simple interactions within each scene, a significant interaction of emotion with distractor type was found for the classroom scene. Subjects who viewed the fear version made more consistent errors than those subjects who viewed the joy version, whereas more opposite errors were made by subjects who viewed the joy version than those who viewed the fear version.

Table 2

Mean Number of Errors in Choosing Nonverbal Distractors

	Immediate	Delayed
Consistent		
Restaurant	.27	.42
Classroom	.44	.62
Telephone	.31	.52
Total	1.02	1.56
Opposite		
Restaurant	.27	.33
Classroom	.23	.33
Telephone	.31	.50
Total	.81	1.26

Note. For each scene, 2 consistent and 2 opposite errors were possible.

DISCUSSION

The major findings in this thesis research were: (a) subjects demonstrated significant retention of surface form of dialogue in a natural setting, without knowledge that they would be tested and (b) when subjects did make errors on the recognition test, they tended to choose distractor items congruent with the particular emotion viewed.

Although there was a main effect of test in which memory for surface form was better when subjects were tested immediately than when they were tested after a delay, performance of choosing the target, given correct memory for meaning, was well above chance level for both immediate and delayed test conditions. This finding provides further support to the studies of Kintsch and Bates (1977) and Keenan, MacWhinney and Mayhew (1977) and the argument that surface form may play a different role in natural discourse than it does in traditional laboratory studies using prose passages. In these latter studies, the surface form in prose passages may merely function to convey semantic information about the content of the passage, whereas the surface form in natural discourse may function pragmatically to highlight or emphasize information as well as serve as the focal point for utterances such as jokes and figures of speech.

Subjects also demonstrated good memory for meaning, with better memory when testing was immediate rather than delayed. Memory for surface form and meaning was not reliably influenced by the type of nonverbal processing that the subject performed. This indicates that the tasks of nonverbal processing did not draw enough attention away from the verbal content of the dialogue, and therefore resulted in no difference between the surface and deep task conditions for memory of surface form and semantic content. Again, subjects demonstrated excellent retention of the surface form and semantic content of the videotaped

scenes' dialogue. However, when subjects did make errors on the recognition test, they tended to choose nonverbal distractors that were consistent rather than opposite of the particular emotional version of the scene viewed. This implies that subjects encoded the nonverbally communicated emotion and is consistent with the prediction that nonverbally communicated emotion affects or influences memory for dialogue. This effect was not obtained for the telephone scene, however. This scene also did not possess good pilot ratings due to subjects' inability to discriminate accurately between the fear and anger versions.

The finding that subjects chose more of the nonverbal distractors after a delay of one week than immediately may initially appear to provide support for the notion of the nonverbally communicated emotion operating in memory via reconstructive processes. However, an important postulation of the reconstructive approach is that subjects utilize or rely on a retrieval bias to reconstruct the original event after much of the detailed and specific aspects have been "forgotten." Although subjects' recognition of surface form and meaning of the dialogue decreased during the week retention interval, subjects did not appear to fill in these gaps, created by this decrease, by choosing more of the consistent rather than the opposite nonverbal distractors at the delayed testing. Therefore, the hypothesis that the effect of emotion, portrayed nonverbally, on memory for verbal content operated via reconstructive processes was not supported by the data. Perhaps the result that subjects chose more nonverbal distractors at delayed rather than immediate testing indicates a tendency for subjects to choose "emotional" items across the board when memory for surface form and meaning has decresed. The data is consistent with the constructive approach in that there was no difference between the immediate and delayed test conditions in choosing consistent nonverbal distractors. However,

the hypothesis that the constructive view would be supported by no difference in choosing consistent nonverbal distractors seems to reflect the need for a better methodology. One that can more clearly assess and separate the reconstructive and constructive effects. Further studies could attempt to make this distinction clear by providing subjects with a debriefing form, upon completion of the experiment, in which subjects could reevaluate their responses on the recognition test and indicate whether the distractor items were actually heard, whether they were inferred or whether they were neither heard nor inferred. If subjects evaluated their choice of a nonverbal distractor as one they inferred, this would lend support to the reconstructive view that traces of nonverbal information and verbal content are stored separately and that subjects can make the distinction between what they heard and what they inferred from the nonverbal information. On the other hand, if subjects evaluated their choice of a nonverbal distractor as one they heard, this would reflect the characteristic of the constructive viewpoint that nonverbal information becomes integrated with verbal content into a holistic representation and that subjects are unable to distinguish between the two types of information at testing.

The hypothesis that deep processing of nonverbal information may determine the abstraction of emotional concepts and thereby influence memory for dialogue on a subsequent recognition test was not supported in this study. There was no reliable main effect of task. It did not matter if subjects rated nonverbal behaviors on a surface or deep level; the effect was the same. This can be interpreted as automatic emotional processing of nonverbal behaviors that fails to be influenced by experimental task. Perhaps subjects are so used to extracting meaning from nonverbal behaviors when watching or engaging in a conversation, that they unconsciously extracted meaning from the nonverbal behaviors that they were asked only to attend to. Since this processing of

nonverbal information occurs automatically and unconsciously, it is reasonable to assume that subjects in the surface and deep task condition processed the nonverbally communicated emotion at the same level and that this was reflected by no difference between the two task conditions in influencing memory for the dialogue.

The results obtained in this research contain implications regarding our everyday engagement in or observation of conversation. Primarily, the processing of a conversation does not just consist of processing the verbal content. It is a more complex and integrative phenomenon in which people also process nonverbal information transmitted by such cues as facial expression, voice tone and body posture. Meaning seems to be automatically extracted from this nonverbal information and inferences made. Perhaps this extraction of meaning and the occurrence of inference serves to aid the listener in comprehending the dialogue, or to support or disconfirm preconceived notions about or relevant to the speaker.

Not only does nonverbal information get encoded and function as an aid in comprehending a conversation, it also influences our memory for the verbal content. Recall the illustration of the young man and his "sad" mother presented at the beginning of this paper; the son's memory for his mother's reaction was influenced by the nonverbal behaviors she displayed and he processed. This implies that memory for conversation does not just consist of its verbal content but various other aspects as well. For example, memory for a conversation may include memory for the time of day or night it took place, memory for the particular setting and finally, memory of the other person's behavior and general attitude. The first two aspects could serve as retrieval cues and help one to remember the original event, but it is doubtful that they influence memory for the verbal content. The third aspect of nonverbal

information, via body movements, facial expressions and voice tone does influence memory for the verbal content of the dialogue. Perhaps the use of these nonverbal behaviors in order to comprehend or make inferences when processing the event leads to their storage in memory for the conversation as a whole.

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